

## **2.0 PROGRAM FUTURE PLANS**

The OCRWM Program Business Plan provides brief statements of work and an estimate of costs for various contracted activities. It is anticipated that the OCRWM Program will have four primary and distinct contract activities during the next decade (through 2010)—design and licensing, construction, transportation, and repository operations. These contract activity segments correlate roughly to the first six phases of the OCRWM Program, as listed in Section 1.6. Various functional activities will require support from independent contractors and financial assistance agreements with state and local governments and Indian tribes for training and emergency preparedness. However, maintenance and continued implementation of the standard contracts that DOE has executed with individual owners and generators of spent nuclear fuel and/or high-level radioactive waste (10 Code of Federal Regulations [CFR] Part 961) are not included in the OCRWM Program Business Plan. The OCRWM Program Business Plan focuses on summary statements of work and discussions of the contracting opportunities anticipated during the next 10 to 12 years.

### **2.1 POTENTIAL STATEMENTS OF WORK**

The following sections provide discussions about the current and future work necessary to proceed with the disposal of spent nuclear fuel and high-level waste. Additional discussions of work and cost information can be found in the Waste Acceptance, Storage, and Transportation section of the OCRWM Program Plan, Revision 2 [Reference 1, pages 37–44) and in Volumes 4 and 5 of the Viability Assessment [References 3 and 4]. Schedules for key activity milestones are presented in Section 6.0 of this OCRWM Program Business Plan.

Innovative concepts, such as those presented in the Clinger-Cohen Act, Government Performance and Results Act, Government Management Reform Act, Federal Acquisition Streamlining Act, contract reform initiatives, performance-based incentive fee contracting methods, commercial and industry contracting practices, and government and commercial initiatives, have been considered in the development of this Program Business Plan. Several of the activities discussed below may be appropriate for firm-fixed pricing, cost incentives, performance-based incentives, or any combination of the preceding and other acquisition concepts. However, the contracting method will be selected after an assessment and qualification of project uncertainties. For each contracting method that is selected, the contractor will use adequate project controls that suit the nature of the contract and reflect good business practices.

As stated previously, the OCRWM Program phases may or may not correspond to the potential contract periods of performance. The need for pre- and post-phase planning and closeout activities may require contract periods of performance to begin prior to the start of an actual Program phase or extend past completion of the Program phase. Additionally, some specific tasks may be repeated in the major contract sections and may subsequently shift between major contract statements of work based on development of detailed acquisition strategy documents. The contract periods of performance are depicted graphically in Figure 2-1. Schedules for the potential contract periods of performance are presented in Section 6.0.

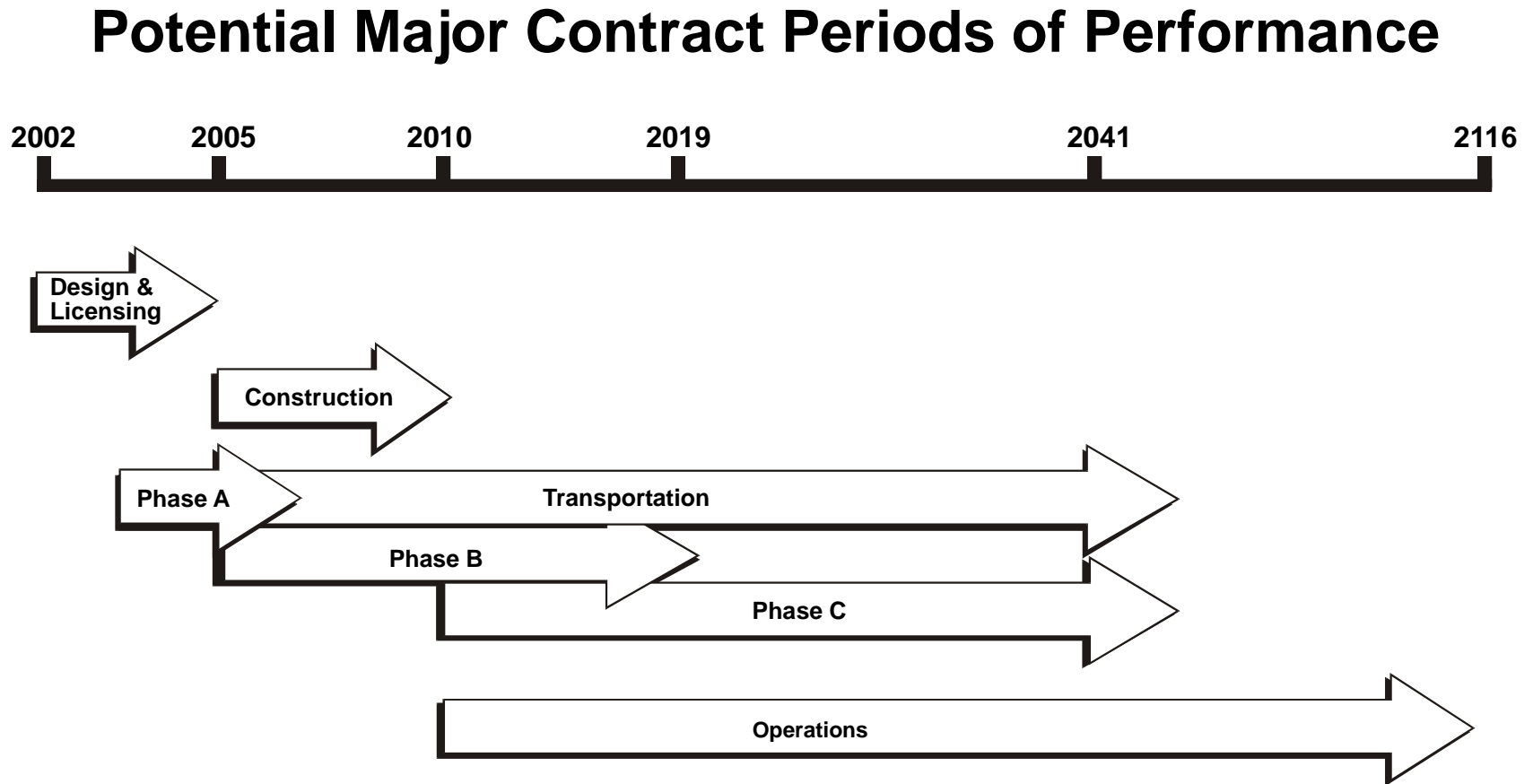


Figure 2-1. Potential Major Contract Periods of Performance

### **2.1.1 Major Contracted Activities**

The following sections discuss the four major contracting activities anticipated for the OCRWM Program in the near term. The period of performance in total extends from as early as Fiscal Year 2000 through Fiscal Year 2116, with the eventual closure and decommissioning of the repository. During this period, it is anticipated that contracts will be recompeted periodically and contractors will change over time. Also, it should be noted that the division of duties discussed in the following sections represents flexible rather than rigid demarcations. That is, the actual statements of work for individual contracts may vary.

The current contract arrangement for conducting the characterization of the Yucca Mountain Site is a management and operating contract with a combination performance-based award fee evaluation mechanism. There is a single prime contract with multiple major subcontracts working together under various partnership and subcontract arrangements. Support from the USGS and the National Laboratories is provided directly to the prime contractor under various interagency agreements and integrated contractor orders held by DOE. The contract was awarded with a base period and options. Significant work activities include the following:

- **Core Science**—The Core Science activities focus on investigating the geologic conditions of the Yucca Mountain site and determining the ability of Yucca Mountain to act as a natural barrier to radionuclide release into the environment. Core Science activities include collecting and testing geologic, hydrologic, geochemical, and geomechanical site characterization and performance confirmation data from the subsurface and surface. The ongoing collection of data through FY 2001 will include data from short- and long-term testing programs (both on the surface and underground) that produce quality field and laboratory measurements for use in conceptual and numerical process models and engineering design calculations. These data will provide an increased understanding of the hydrology, geology, and geochemistry of the site and supply information on how thermal, hydrologic, chemical, and mechanical processes behave in the immediate natural environment. The purpose of these data is to reduce uncertainties associated with how the natural barriers will perform with engineered systems over thousands of years. Other Core Science activities include collecting and monitoring environmental data to ensure compliance with regulatory requirements; testing material performance; planning, formulating, modeling, and testing scientific hypotheses; completing models and reports; and collaborating with the international scientific community, including Russian scientists and engineers, on characterization issues of mutual interest.
- **Design and Engineering**—Design and Engineering activities focus on developing and refining the preliminary repository and waste package designs and will become more detailed as continuing science and modeling activities further refine the design characteristics of the repository. A quality assurance verification of the design to be used in the Total System Performance Assessment for both a decision on Site Recommendation and later a License Application will be completed. In addition, several key design alternatives will be evaluated, as proposed in the Viability Assessment, Volume 2. Alternative designs are being evaluated to reduce the uncertainties regarding the performance of the repository over thousands of years. These alternatives include continuous ventilation of the wastes, both pre- and post-closure; alternative waste package designs and materials (depending on the waste type);

lower thermal loads in the underground emplacement drifts; self-shielded waste package designs that eliminate most underground remote handling operations; and different waste package emplacement configurations (in-drift, in-floor emplacement). Value engineering will be used to determine and maintain essential functions at the lowest life-cycle cost consistent with the required levels of performance, reliability, availability, quality and safety, and security.

The design to support the Site Recommendation Report and License Application will be selected and documented. These documents will include safety and accident analyses and will describe the design in sufficient detail to show whether the repository may be operated safely during waste emplacement in Yucca Mountain and after all waste packages have been emplaced (i.e., postclosure period).

Important areas of ongoing design emphasis include waste package materials; waste form testing and analyses; waste handling system and emplacement operations; a description of how the Monitored Geologic Repository would operate (i.e., repository concept of operations); a demonstration of design compliance with codes, standards, and regulatory requirements (i.e., design verification); assurance that the technical work being performed within the individual engineering specialties is integrated (i.e., interface control); and detailed engineering for these elements of the repository system that show no similarities to systems licensed previously in commercial nuclear power plants.

- **Suitability/Licensing and Performance Assessment**—The objective of this assessment activity is first to compile the technical documentation that will support the Site Recommendation Report and second, if the Secretary of Energy decides to recommend the Site and the President and Congress approve the recommendation, to complete the License Application and submit it to the Nuclear Regulatory Commission. A Site Recommendation Consideration Report will be developed to provide the technical bases required under the Nuclear Waste Policy Act of 1982, as amended, as part of the Site Recommendation Report. This report, the final Environmental Impact Statement, and other information required by the Nuclear Waste Policy Act of 1982, as amended, will be considered by the Secretary of Energy in deciding whether to recommend the site to the President.

Complete program records are critical to the preparation of the Environmental Impact Statement, reports supporting a Site Recommendation Report and License Application, and for the Nuclear Regulatory Commission's license review process. All technical data used for the repository design, Total System Performance Assessment, and models for site processes and conditions must be traceable and electronically retrievable in accordance with 10 CFR 960 Part 2, Subpart J. The latest web-based technologies will be utilized to ensure that program data and records are quickly and easily retrievable at the time that the Secretary of Energy decides whether to recommend the site to the President.

- **National Environmental Policy Act**—This activity entails amassing the environmental data that will form the basis of the Environmental Impact Statement for a *Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*. The Nuclear Waste Policy Act of 1982, as amended, requires that an Environmental Impact Statement be included in a Site Recommendation Report and that the Nuclear Regulatory Commission, in granting repository construction authorization, adopt the

DOE's Environmental Impact Statement to the extent practicable. The draft Environmental Impact Statement will be completed and issued for public review and comment. The final Environmental Impact Statement will evaluate potential environmental impacts associated with building, operating, and eventually closing a repository at Yucca Mountain. Data to support the Environmental Impact Statement will be generated by Core Science, Design and Engineering, and Suitability/Licensing and Performance activities.

- **Operations/Construction**—Operations/Construction activities include providing, maintaining, and managing the operating systems, structures, and construction necessary to support the Yucca Mountain site characterization effort. Operations activities include maintaining facilities and systems constructed to gather site characterization data; maintaining facilities in the central support area at the site; providing and maintaining site utilities and communications; and providing transportation for site workers. Construction activities include constructing and modifying test areas; changing the configuration of the Exploratory Studies Facility (ESF) to provide a fully functional underground scientific research facility; and providing direct support for test setup and execution. Scientific and technical support facilities constructed to support testing include the Exploratory Studies Facility, Busted Butte Facility, Fran Ridge Facility, and various surface test drilling sites (boreholes). The ESF which is the cornerstone of the underground characterization effort, includes the 5-mile Main Loop, 1.7-mile Cross Drift, and 11 large test areas. These test areas provide access for the collection of observational and confirmatory data to support the data in the Viability Assessment and for the Site Recommendation Report. The Central Support Area, originally constructed in the late 60s and early 70s, consists of existing buildings, roads, utilities, and communication systems that have been rehabilitated and are maintained to provide the necessary base of operations.
- **Project Management**—Project Management provides support to technical and scientific programs allowing for the planning, funding, managing, measuring, and processing of data. Most importantly, project management activities will support program goals to complete the Site Recommendation Report; a decision whether to recommend the Site and submit a License Application (if the Site is determined to be suitable). Project Management will provide the systems and processes necessary to conduct institutional, scientific, and technical activities. Specific project management activities include: an Earned Value Management System that involves planning, scheduling, and measuring performance for all of the Yucca Mountain Site Characterization Project elements, as well as information technology and telecommunications management; leases; office services, training, security, and procurement; facilities management and motor pool operations; records management; and technical document control. Project management also includes conducting public information and outreach programs to ensure that open and informative interactions with the public and program stakeholders are continued.

Table 2-1 presents the estimated annual program costs for the major business and management centers from Fiscal Year 2000 through Fiscal Year 2010. These costs are presented in a functional manner (i.e., Monitored Geologic Repository; Acceptance, Transportation, and Integration; and Program Management Center) as opposed to a format that matches the major contract activity summaries. Further discussion of these costs can be found in the Analysis of

the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program [Reference 5].

**Table 2-1. Major Cost Centers for Contract Activity<sup>1, 4</sup>**  
**(in millions of 1998 dollars)**

<b>Year</b>	<b>MGR</b>	<b>ATI<sup>2</sup></b>	<b>PMC<sup>3</sup></b>	<b>Total</b>
2000	312	6	92	410
2001	284	5	98	387
2002	273	24	99	396
2003	285	47	96	428
2004	312	31	91	434
2005	610	70	100	780
2006	760	250	120	1,130
2007	620	130	120	870
2008	590	170	140	900
2009	360	160	140	660
2010	370	160	140	670
<b>Total</b>	<b>4,776</b>	<b>1,053</b>	<b>1,236</b>	<b>7,065</b>

<sup>1</sup> Adapted from the Analysis of the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program [Reference 5].

<sup>2</sup> The Acceptance, Transportation, and Integration total includes the State of Nevada transportation costs.

<sup>3</sup> The Program Management Center column combines program integration and institutional costs.

<sup>4</sup> These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.

ATI = Acceptance, Transportation, and Integration

MGR = Monitored Geologic Repository

PMC = Program Management Center

### **2.1.1.1 Design/Licensing**

The licensing phase will focus on the integration of site data, facility design, and repository performance and is expected to begin in March 2002 and run through completion of action on the Nuclear Regulatory Commission Construction Authorization expected in 2005. However, it is anticipated that the design/licensing-contracted activities may start 12 to 18 months prior to this phase and may extend through completion of construction. Although a significant amount of design work will occur prior to 2002, final designs in support of Construction Authorization will be completed during this phase. Vast amounts of data have been collected at the Yucca Mountain site over the past 15 years. Four national laboratories (i.e., Los Alamos National Laboratory, Sandia National Laboratory, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory) and the U.S. Geological Survey, all under contract to DOE, have collected the majority of the data. Preliminary designs for the surface facilities, underground repository openings, and waste packages have been developed largely by the current management and operating contractor. In addition, numerous iterations of the Total

System Performance Assessment have been performed, earlier by Sandia National Laboratory and more recently by the current management and operating contractor. Data are collected, analyses are performed, and designs are developed in accordance with the Nuclear Quality Assurance Program approved by the Nuclear Regulatory Commission. We expect that interactions with the Nuclear Regulatory Commission will increase as the OCRWM Program engages in development of a License Application and precicensing issue resolution process. The following specific activities will constitute much of the scope of this contracted activity:

- **Licensing**—The licensing scope covers a wide range of activities, including developing the License Application; supporting pre-License Application public hearings; supporting licensing hearings; developing, reviewing, and submitting License Application updates, as required by the Nuclear Regulatory Commission; supporting the Nuclear Regulatory Commission's review of the preoperational test results; and developing technical specifications.
- **Technical Data Management Systems**—License Application design requirements and technical information will be compiled, maintained, and distributed (as necessary) to support the Nuclear Regulatory Commission's licensing evaluations, License Application updates, procurement, construction design, and performance confirmation activities. It is anticipated that the OCRWM Program will continue to utilize emerging technology to assimilate and maximize management of the Yucca Mountain Site Characterization Project technical data.
- **Total System Performance Assessment**—The Total System Performance Assessment will be further refined after License Application submittal and prior to receipt of the Construction Authorization. The purpose is to reduce uncertainties and incorporate additional data or comments from entities such as the laboratories and Nuclear Waste Technical Review Board. Thorough integration of this information is essential to the success of the License Application submittal and receipt of Construction Authorization.
- **Designs and Specifications**—Final designs for the surface-based waste handling facilities and subsurface facilities (including underground emplacement drifts and waste package containment vessels) will be developed, presented, and defended during the course of this contracted activity. Integration of the designs with the results of the natural system testing programs and Total System Performance Assessment iterations will be essential. Much of the design work to date has been performed by the present management and operating contractor.
- **Site, Repository, and Waste Package Testing and Performance Confirmation Monitoring**—Testing programs directed at characterization of the natural environment, collection of data to support repository design, and long-term waste package material testing programs are currently under way. These testing programs must continue and transition to a performance confirmation-oriented program as required by Nuclear Regulatory Commission regulations.

The design and licensing contractor may perform continuous, periodic inspections and construction acceptance as the work progresses, except for turnkey activities where the constructor is a subcontractor to the design/licensing contractor and the designer would be reviewing its own work. In this situation, DOE will procure an independent architect-engineer to conduct such services.

### **2.1.1.2 Construction**

The construction phase is expected to begin in March 2005 and run through February 2010. The construction phase will start after the Nuclear Regulatory Commission authorizes construction; however, it is possible that several construction activities may begin 12 to 18 months prior to the start of the construction phase (i.e., 2003 or 2004). Tasking for construction includes major capital expenditures, subsurface excavation, and surface construction of facilities within the radiologically controlled area and balance-of-plant facilities, and initial waste package fabrication. The underground area will include, at a minimum, sufficient development to begin emplacing waste packages in February 2010. The following specific functional areas will constitute much of the scope of this contracted activity:

- **Surface Facilities**—This task will include the work required to construct four major structures/facilities (i.e., site preparation and transportation, site support systems, waste handling structures, and North Portal entrance support structures). Activities may include preparing the site; constructing all major facilities for receipt, handling, and packaging of waste for emplacement; and constructing sitewide facilities and systems, such as balance-of-plant facilities, roads, and on-site rail, water, sewage, electricity, fuels, fencing, communications, and environmental monitoring systems.
- **Off-Site Power**—This task may include the installation and construction of new electrical transmission lines and power distribution equipment necessary to bring a sufficient electricity supply to the repository area to support construction and future operational phases. Electricity could be supplied by solar or wind power systems that could be available in the near future.
- **Subsurface Facilities**—This task may include the work required to construct all access drifts with appurtenant machine assembly chambers and ventilation barriers, emplacement drifts of a suitable number to begin emplacement in 2010, drift turnouts and ventilation shafts suitable to support the initial emplacement drifts, excavation material handling systems, and South Portal entrance support facilities. This task also includes all management and integration activities associated with the construction operation, including architect-engineering services; configuration control of specifications and drawings; and all functions to organize, coordinate, plan, schedule, direct, and inspect the construction activities.
- **Waste Packages**—This task may include initial fabrication. Disposal efforts will focus on commercial spent nuclear fuel, including boiling water and pressurized water reactor assemblies; defense high-level waste; and DOE spent nuclear fuel, including Navy spent nuclear fuel.
- **Performance Confirmation**—A performance confirmation program is required by Nuclear Regulatory Commission regulations to ensure that the waste packages and subsurface repository function in accordance with the license requirements. This task may include a combination of site, repository, and waste package testing; maintenance of the testing facilities; and evaluation of the Total System Performance Assessment models.

- **Regulatory, Infrastructure, and Management Support**—This task may include regulatory support for all Nuclear Regulatory Commission-related activities, such as licensing reviews and updates; preconstruction authorization site services, including performance confirmation testing; environmental, safety, and health compliance, including potential updates of the Environmental Impact Statement; and infrastructure tasks associated with information management, planning, project control, institutional and external affairs, and training to meet quality assurance, safety and health, and other DOE-mandated program requirements.
- **Final Inspection and Acceptance of Construction**—This task may be performed by the design/licensing contractor, except in a turnkey-type activity where the designer would be reviewing its own work. In these cases, DOE will procure the services of an independent contractor to conduct inspections and provide acceptance support.

### **2.1.1.3 Transportation**

The transportation phase will address transportation issues, with varying degrees of focus on planning, mobilization, and operations. This phase is expected to begin in March 2005 and run through 2041. However, pretransportation phase activities may begin as early as 2002. DOE's procurement strategy provides opportunities for private industries to work with DOE to accomplish its mission objectives. DOE will purchase services and equipment from a regional servicing contractor-operated waste acceptance and transportation organization, as described in the draft Request for Proposal dated September 1998 [Reference 6]. The contractor is expected to provide initial financing for the project, including funds necessary for the initial acquisition of operational equipment; establish the necessary management organization; and mobilize the necessary resources and capabilities to provide spent nuclear fuel acceptance delivery services based on a fixed-dollar rate per fuel assembly delivered from each purchaser's site. DOE will retain final approval on all transportation routes and maintain primary responsibility to the states, tribes, and local units of government for assuring appropriate interaction and consideration of their input on the transportation of spent nuclear fuel. The regional servicing contractors will provide all hardware necessary for waste acceptance, transportation, and cask handling and any specialized equipment required for unloading.

To achieve DOE's objectives and provide a capability for responding to contingencies, the contiguous United States is divided geographically into four servicing regions for purposes of this procurement. DOE anticipates that multiple contracts for Phase A (planning) activities will be awarded; however, DOE will reserve the right to award one or more contracts for Phase A activities. DOE will then authorize the regional servicing contractors to proceed into Phase B (mobilization). Phase C (conduct of operations) will commence once a facility becomes operational.

The draft Request for Proposal [Reference 6] states that the "procurement is to contract with private industry for the provision of services, including equipment, to accept spent nuclear fuel at purchaser sites on behalf of DOE and transport the spent nuclear fuel to the federal facility for disposal."

The draft Request for Proposal [Reference 6] has incorporated a number of specific operational details and enhancements that go beyond those currently in the standard contract for disposal of

spent nuclear fuel and/or high-level radioactive waste set forth in 10 CFR Part 961 (Standard Contract). DOE intends to negotiate a bilateral modification of the standard contract, accordingly. These enhancements will allow parties to more effectively and efficiently schedule waste acceptance activities and provide a better understanding of the roles and expectations of the purchasers, DOE, and the regional servicing contractors. The following specific functional areas will constitute much of the scope of this contracted activity:

- **Planning**—This task may include development of detailed management, site servicing, and operational plans and prices for subsequent contract phases and will determine the annual, site-specific, fixed-rate in dollars per fuel assembly for each site being serviced in their region.
- **Mobilization**—This task may last approximately 14 years. The first four years will focus on initial equipment acquisition and operational readiness; mobilization of purchaser site resources and equipment; finalization and Nuclear Regulatory Commission approval of routing; establishment of logistics, security and escorts, communications, real-time tracking, and emergency response capabilities; contracting for all support services; obtaining necessary licenses and permits; and initiating communications and outreach services consistent with the servicing schedules. The last 10 years will be a continuation of the communications and outreach services and other related activities.
- **Operations**—It is anticipated that the 10-year operations period will run concurrently with the last 10 years of the 14 year mobilization period. This task may last 10 years and will begin once a federal facility is operational. The regional servicing contractors will begin accepting spent nuclear fuel at designated purchaser sites in accordance with its Regional Servicing Plan, with subsequent transport to the federal facility. Additionally, the regional servicing contractors may provide appropriate storage units to the federal facility; perform cask and equipment maintenance; deploy new equipment, as necessary; maintain outreach activities, licenses, and permits; maintain a 24-hour-per-day emergency support hot line; and monitor real-time tracking for shipments. Once this phase is complete, all equipment designated by the Contracting Officer and purchased under the contract will be transferred to DOE. The regional servicing contractors will be responsible for deactivating all regional servicing contractor facilities and disposing of all wastes, including hazardous and low-level radioactive waste generated during the course of Phase B and Phase C.
- **Modification of the Statement of Work**—The statement of work may be modified to include waste acceptance and transportation requirements (excluding shipping casks) for DOE-owned spent nuclear fuel, which was irradiated at civilian facilities and for which fees have been paid under the standard contract. The spent nuclear fuel is stored at various DOE facilities throughout the United States and includes approximately 76 metric tons of uranium. It is anticipated that the statement of work also will be modified to cover the acceptance and transportation of DOE high-level radioactive waste.
- **Nevada Transportation**—If the Yucca Mountain site is licensed as a repository, shipments of spent nuclear fuel and defense high-level radioactive waste will move to and within the state of Nevada by some combination of rail, heavy haul truck, and legal weight truck. Rail shipments will require construction of a rail spur from existing mainline rail, and a heavy

haul truck route will require upgrades to whatever heavy haul route is selected. Legal weight truck shipments will comply with Department of Transportation routing guidelines for established highways; however, the states and tribes have the authority to designate another route if alternate routes are available.

Currently, there is no direct rail access to the proposed repository. There are two options for shipments entering the state of Nevada—construct a new branch rail line or use heavy-haul trucks on upgraded existing highways. The current assumption for planning and scheduling purposes is for a contractor to provide to DOE the branch rail detailed designed required for construction. Should a decision be made to construct a new branch rail line, DOE could either issue a new contract specific to this purpose or make it part of another contract. Operation and maintenance of a new branch rail line could be through a DOE contract with a short line operator.

DOE may determine that extensive use of heavy-haul trucks will be relied upon, an intermodal transfer facility may need to be constructed, and the designated route will require upgrades to accommodate heavy-haul trucks. For any transportation mode, DOE will work closely with the state to discuss road upgrades or rail issues. For the intermodal facility, DOE could issue a request for proposal for its design and construction specific to this purpose or make it part of another contracted activity. Operation of an intermodal transfer facility could be under a separate contract or part of a contract for heavy-haul operations.

#### **2.1.1.4 Operations**

The operations phase would begin upon the Nuclear Regulatory Commission's issuance of a license to DOE for the repository to receive and possess waste in approximately 2010 and would continue until closure and decommissioning of the facility in approximately 2116. It is anticipated that the operations contract may be executed 24 to 36 months prior to the operations phase to allow the contractor sufficient time to conduct preoperational activities. The following specific functional areas may constitute much of the scope of this contracted activity:

- **Start-up and Training Activities**—This task may include activities associated with the activation and start-up of surface facilities at the North Portal entrance and other sitewide systems, such as water supply and environmental monitoring. Additionally, this task may include activities associated with hiring, training, and certification of operations staff, construction inspections, operational readiness reviews, and testing integration.
- **Surface Emplacement Activities**—This task may include operation of the waste handling facilities at the North and South Portals, transfer operations, repackaging, radiological control, and decontamination. Additionally, this task may include activities associated with the operation and maintenance of the surface facilities at the North and South Portal entrances and other sitewide systems such as roads, water supply, environmental monitoring, and electrical distribution.
- **Subsurface Emplacement Operations**—This task may include the underground transportation and emplacement of waste packages, the operation and maintenance of subsurface

emplacement utilities, and ventilation. All retrieval operations necessary to recover failed packages or to retrieve packages for testing also may be included in this task.

- **Emplacement Drift Excavation**—This task may include excavation of the emplacement drifts that were not excavated during the construction phase because of operations requirements. All appurtenant chambers, turnarounds, ventilation shafts, and required hardware will be excavated. Additionally, this task may include excavated material handling, support system facility operations, subsurface and surface facility management, and integration.
- **Waste Packages**—This task may include continuing fabrication of waste packages for commercial spent nuclear fuel, including boiling water and pressurized water reactor assemblies; defense high-level radioactive waste; and DOE spent nuclear fuel, including Navy spent nuclear fuel.
- **Regulatory Compliance, Infrastructure, and Management Support**—This task may include regulatory compliance support for all Nuclear Regulatory Commission-related activities, such as reporting requirements; records retention; licensing reviews and updates; environmental, safety, and health compliance and monitoring, including potential updates of the Environmental Impact Statement; and infrastructure tasks associated with information management, planning, project control, institutional and external affairs, and training to meet quality assurance, safety and health, and other DOE-mandated program requirements.
- **Performance Confirmation**—This task will include a continuation of the performance confirmation program that began during the construction phase. This task may include the operation and maintenance of all tests and equipment associated with the performance confirmation phase, including analyses, evaluations and reporting of test results, and subsequent review of the Total System Performance Assessment models.

## **2.1.2 Support**

Support service contracts provide an independent assessment that is necessary for proper program management. In addition, support activities can be used as a cost-effective method for obtaining short-term, specialized scientific, technical, and management expertise to solve unique problems and to contract work to the private sector consistent with Office of Management and Budget Circular A-76. Often, specialized skills are not required on a long-term basis, and it would not be prudent management to hire federal staff with specific skills for a short-term task. Given the changing phases of the OCRWM Program, the skills required to meet the characterization, design, regulatory, licensing, transportation, and potential construction and operations functions will change significantly as the Program progresses. Appropriate support contracts will be required from the present to at least 2010.

The following sections briefly describe the support activities currently in place and those anticipated in some functional form during the period covered by this Program Business Plan. These activities cover a broad range of services, including, but not limited to, administrative, quality assurance, technical oversight, and technical information management.

### **2.1.2.1 Management and Technical Support**

The management and technical support contractor provides independent reviews of work in the areas of design, licensing, and construction of the potential geologic repository. Additionally, the management and technical support contractor provides management evaluation support, including independent analyses of Management and Operating (M&O) contractor work plans, schedules, and cost estimates. Specific management and technical support contractor support includes, but is not limited to, the following:

- Conduct independent technical reviews of the work accomplished by the DOE national laboratories and other contractors involved in the site characterization phase for Yucca Mountain, design and licensing of the potential geologic repository, and national transportation efforts.
- Review and analyze technical studies, papers, regulatory documents and reports, and major Program documents, such as the Process Model Reports, Site Recommendation, and License Application.
- Conduct independent peer reviews of designs, analyses, and physical process models.
- Review and analyze the designs and documents that support licensing and construction activities.
- Conduct independent analyses of contractor work plans, schedules, and cost estimates.
- Provide specific technical expertise, as required by OCRWM, in the following areas:
  - Nuclear engineering.
  - Performance assessment.
  - Waste acceptance and transportation operations.
  - Environment, safety, and health.
  - National Environmental Policy Act statutory requirements.
  - Licensing and Nuclear Regulatory Commission statutory framework.
  - Design, engineering, design analyses, design basis documents, and process modeling.
  - Physical sciences related to geology, hydrology, rock mechanics, and tectonics.

### **2.1.2.2 National Environmental Policy Act Support**

The National Environmental Policy Act contractor is responsible for supporting public hearings and preparing the draft and final Environmental Impact Statements using technical data developed by OCRWM and the management and operating contractor. The NWPA requires that an Environmental Impact Statement is prepared and that it accompanies any recommendation to the President. Specific National Environmental Policy Act support includes, but is not limited to, the following:

- Develop and prepare National Environmental Policy Act documentation.
- Ensure that activities mandated by the NWPA are conducted in compliance with the National Environmental Policy Act requirements, the Council of Environmental Quality, and DOE National Environmental Policy Act implementing guidelines and requirements.
- Develop an Environmental Impact Statement to assess the environmental impacts associated with the construction, operation, monitoring, and eventual closure of a geologic repository for spent nuclear fuel and high-level waste. This includes impacts from connected actions, such as transportation.
- Provide support to OCRWM in the development of a Comment Response Document, which will address comments received during the draft Environmental Impact Statement public comment period.
- Assist DOE in identifying needs for additional data, notwithstanding the fact that the Environmental Impact Statement will draw primarily from information, data, and analyses generated to date by other DOE contractors and cooperating agencies.

### **2.1.2.3 Quality Assurance Support**

The quality assurance support contractor evaluates Program compliance with Nuclear Regulatory Commission requirements, develops and maintains the OCRWM Quality Assurance Requirements and Description document and assists the OCRWM Office of Quality Assurance in providing overall quality assurance guidance and direction to all program participants. Specific quality assurance support includes, but is not limited to, the following:

- Provide analytical support in reviewing the major participants' quality assurance program documents, procurement documents, and suppliers' quality assurance documents.
- Verify the status, adequacy, effectiveness, and compliance with OCRWM's quality assurance program, including conducting surveillances, audits, inspections, and reviews.
- Assist OCRWM in developing, implementing, and coordinating its internal Quality Concerns Program.
- Provide assistance with quality assurance indoctrination and training activities.

- Facilitate interactions among OCRWM, the Nuclear Regulatory Commission, the Nuclear Waste Technical Review Board, external agencies, boards, commissions, and public/private organizations concerning quality assurance issues.
- Perform preliminary, in process, and final inspections and tests of witness and hold points established by project design documents.

#### **2.1.2.4 Quality Assurance Management Assessment**

The quality assurance management assessment contractor assists OCRWM in conducting its annual quality assurance management assessment to verify adequacy and effectiveness. The annual assessment includes, but is not limited to, the following:

- Evaluation of all OCRWM organizational components and other affected organizations (i.e., organizations that comply with the OCRWM Quality Assurance Requirements Document).
- Evaluation of the scope, status, adequacy, and effectiveness of the OCRWM quality assurance program. This evaluation is conducted from October 1 to July 1 of each fiscal year.
- Assessment of the following factors:
  - Effectiveness of procedural compliance.
  - Extent, adequacy, and effectiveness of quality assurance training.
  - Management and understanding of the objectives and benefits of the quality assurance program.
  - Management and staff acceptance of the quality assurance requirements as part of their daily activities.
  - Adequacy of resources available for quality assurance development, maintenance, and implementation.
  - Adequacy and effectiveness of the corrective action program.

#### **2.1.2.5 Information Technology**

The information technology contractor assists in the operation and management of the OCRWM communications network and computer facilities, including support to web-based licensing systems, web page development, computer hot line and help desk support, software and hardware installation and maintenance, and early evaluations of enhanced software. Specific information technology support includes, but is not limited to, the following:

- Manage, operate, maintain, and provide security for OCRWM network and computer facilities, including continuous, efficient, and effective operations of the OCRWM Wide Area Network(s) and Local Area Network(s).
- Provide training courses for OCRWM requirements and monitoring and reporting activities.
- Support OCRWM Information Management planning activities, including conducting technology assessments and evaluations, monitoring technology trends, and maintaining current hardware and software information.
- Provide administrative support and technical services necessary for optimum customer service, including help desk and technical support.
- Provide software engineering, design, development, and maintenance support.
- Manage the physical security system at the Yucca Mountain Site Characterization Office facility in Las Vegas, Nevada.

#### **2.1.2.6 Administrative Support**

Consistent with Office of Management and Budget Circular A-76, DOE has evaluated these activities and determined it is appropriate to contract for this support. Additionally, this allows more effective use of limited federal positions. The administrative support contractor provides administrative support to OCRWM on an as-needed basis. Specific administrative support includes, but is not limited to, the following:

- Operate a word processing center utilizing government-furnished equipment for producing draft and final copies of correspondence, reports, and other miscellaneous documents.
- Assist in ordering supplies and services, monitoring stock shelves in the self-service supply room, receiving office supplies, and coordinating the work of movers and carpenters.
- Perform internal mail distribution of interoffice correspondence and work-related materials.
- Perform routine administrative duties.
- Maintain proficiency in office equipment operations.
- Manage the day-to-day facility activities.

#### **2.1.2.7 Financial Auditing Support**

The financial auditing support contractor provides support to OCRWM consistent with the Government Management Reform Act and the Federal Managers Financial Integrity Act. It allows OCRWM to respond meaningfully to the mandate of Section 304(c) of the NWPA, which (among other things) requires that OCRWM annually report to Congress on the expenditures of the Office. Specific financial auditing support includes, but is not limited to, the following:

- Conduct an annual audit of OCRWM's financial statements, which are published as an appendix to OCRWM's Annual Report to Congress and incorporated into the DOE-wide consolidated financial statements, to determine whether they present fairly, in all material aspects, the financial position and results of operation and to ensure compliance with the current edition of the Form and Content of Agency Financial Statement published by the Office of Management and Budget.
- Prepare an opinion or disclaimer of opinion, as appropriate, for OCRWM's financial statements.
- Prepare a report on OCRWM's internal control structure.
- Prepare a report on OCRWM's compliance with the laws and regulations expected to have a material effect on the financial statements under audit.
- Prepare a management letter describing internal control deficiencies not considered to be material weaknesses or reportable conditions.

### **2.1.2.8 Support Costs**

Table 2-2 presents the anticipated cost profile by support element for the time period covered by the OCRWM Program Business Plan.

***Table 2-2. Support Costs (in millions of 1998 dollars)***

<b>Year</b>	<b>MTS</b>	<b>NEPA</b>	<b>QA</b>	<b>QAMA</b>	<b>IT</b>	<b>ADMIN</b>	<b>AUDIT</b>
2000	10 to 12	5.6	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2001	10 to 12	0.2	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2002	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2003	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2004	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2005	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2006	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2007	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2008	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2009	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5
2010	10 to 12	0	10 to 15	0.3 to 0.5	5 to 6	1.0 to 1.5	0.3 to 0.5

*Further information on the Yucca Mountain Site Characterization Project portion of the cost in Table 2-2 can be found in Sections 5.2 and 6.0 of Volume 4 and Appendix F of Volume 5 of the Viability Assessment [References 3 and 4].*

*These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.*

*IT = information technology*

*MTS = management and technical support contractor*

*NEPA= National Environmental Policy Act*

*QA = quality assurance*

*QAMA = quality assurance management assessment*

### **2.1.3 Financial Assistance**

The NWPA specifies that technical assistance and funding shall be provided to state, local, and Indian tribal governments for open participation in OCRWM activities and training for public safety officials who have jurisdiction over the spent nuclear fuel or high-level radioactive waste transport routes. It is anticipated that financial assistance will be in the form of cooperative agreements and grants, as defined in the Federal Grant and Cooperative Agreement Act, Public Law 95-224. Additionally, it is anticipated that financial assistance will be available beginning in 2002.

#### **2.1.3.1 Cooperative Agreements**

The NWPA states that open participation in OCRWM activities is essential for promoting public confidence. Under the NWPA, governors, state legislatures, Indian tribes, and the general public are expressly designated as active participants in site consideration, investigation, and the approval process for repository siting and transportation.

Cooperative agreements will be awarded to nonprofit national and regional associations of states and tribes to conduct the following:

- Convene spent nuclear fuel and high-level radioactive waste transportation committees.
- Inform state and tribal officials on the status of spent nuclear fuel and high-level radioactive waste transportation relative to their jurisdictions.
- Monitor relevant regional, state, tribal, and local emergency preparedness and emergency response initiatives.
- Exchange information on state and tribal infrastructure initiatives related to the transportation of spent nuclear fuel and high-level radioactive waste.
- Participate in DOE Transportation External Coordination Working Group meetings, which will be co-chaired by OCRWM.

Continuing efforts to review and analyze data relevant to these issues; identifying new issues of concern to state, tribal, and local governments; and working toward resolution can best be accomplished through the framework of the existing associations' multistate or multitribal institutional forums, where the interests of all participants are represented.

#### **2.1.3.2 Section 180(c) Grants**

Section 180(c) of the NWPA states that technical and financial assistance will be provided to the states for training public safety officials of appropriate units of local government and Indian tribes through whose jurisdiction the Secretary of Energy plans to transport spent nuclear fuel or high-level radioactive waste to a facility authorized under the NWPA. This training will cover the procedures required to safely transport these materials, as well as procedures for dealing with emergency response situations.

After considering comments received on three prior notices, reviewing input from stakeholders in various forums, and conducting extensive research, the Federal Register (FR) published another Notice of Revised Proposed Policy and Procedures on April 30, 1998 (63 FR 23753). This notice details the policy and procedures by which OCRWM currently intends to implement Section 180(c) of the NWPA. The policy and procedures will remain in draft form until program progress or legislation provides definitive guidance as to when shipments will commence. At that time, OCRWM will finalize the policy and procedures or consider promulgating regulations on implementing Section 180(c).

### **2.1.3.3 Financial Assistance Costs**

Table 2-3 shows the anticipated financial assistance profile for the time period covered by the OCRWM Program Business Plan.

**Table 2-3. Financial Assistance**  
*(in millions of 1998 dollars)*

<b>Year</b>	<b>Financial Assistance</b>
2002	1
2003	1
2004	1
2005	1
2006	9
2007	5
2008	11
2009	11
2010	11
2011	12
2012	12

*Further information on the cost in Table 2-3 can be found in the Total System Life Cycle Cost [Reference 5, pages 33–35].*

*These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.*

## **2.2 PROGRAM COST**

The cost history and projection for the potential repository are presented in Tables 2-4 through 2-6. Table 2-4 provides a history of past Program activities by year-of-expenditure dollars. Table 2-5 provides an estimate of future cost in constant 1998 dollars, as discussed in the Total System Life Cycle Cost [5]; and Table 2-6 provides an incremental comparison (in constant 1998 dollars) of the Viability Assessment as a subset of the Total System Life Cycle Cost.

**Table 2-4. Program Cost History<sup>1</sup> (Nuclear Waste Fund and Defense Appropriations)**  
(in thousands of dollars)

PROJECT	FY83	FY84	FY85	FY86	FY87	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	TOTAL
<b>NUCLEAR WASTE FUND (OCRWM)</b>																	
FIRST REPOSITORY																	
Basalt Project	42,959	60,307	69,848	104,487	128,179	61,707	8,656	4,592	1,368	909	475	221	71	3	0	0	483,783
Yucca Mountain Project <sup>2</sup>	50,375	65,285	63,527	89,981	103,172	140,857	180,189	180,564	181,148	189,437	229,053	279,713	377,469	249,298	274,625	341,300	2,995,995
Salt Project	64,079	83,838	87,843	98,017	115,070	54,220	9,486	1,468	412	(193)	525	(257)	282	(155)	27	(238)	514,423
RTP/Technical Support	0	0	0	0	37,404	47,667	38,072	17,855	5,743	11,335	481	108	533	(2)	0	0	159,196
SECOND REPOSITORY	8,376	17,094	22,370	26,028	6,988	375	58	0	0	0	0	0	(3)	5	0	0	81,291
ATI PROJECT																	
MRS	3,723	10,436	15,339	5,925	1,384	1,364	1,566	2,109	5,459	21,336	15,385	3,698	8,152	114	0	0	95,990
Engineering Development <sup>3</sup>	0	0	179	3,097	10,557	7,991	5,323	10,255	9,055	6,398	4,290	12,065	9,709	15,381	947	328	95,573
Transportation System	0	1,541	2,226	5,768	10,835	15,582	25,901	21,628	19,792	16,635	15,149	15,167	10,736	5,665	3,317	2,114	172,056
Waste Acceptance <sup>4</sup>	0	0	0	0	0	0	0	0	0	0	6,630	3,721	4,748	4,195	675	738	20,708
Project Integration <sup>5</sup>	0	0	0	0	0	0	0	0	0	0	0	0	1,785	3,611	1,033	1,752	8,181
Spent Fuel Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	2,331	3,318	1,588	7,237
PROGRAM INTEGRATION																	
Quality Assurance	0	0	0	0	0	136	471	1,588	2,911	3,179	10,593	12,628	11,744	18,297	15,478	10,670	87,696
Program Management and Integration <sup>6</sup>	8,651	36,382	54,350	64,824	54,909	51,850	60,830	57,978	71,225	66,417	59,347	50,855	51,331	34,845	31,037	33,314	788,147
Human Resources and Administration	147	1,108	574	584	686	275	283	7,661	5,287	10,795	28,433	27,096	31,065	10,825	9,344	10,240	144,401
<b>TOTAL (OCRWM)</b>	<b>178,311</b>	<b>275,992</b>	<b>316,255</b>	<b>398,711</b>	<b>469,185</b>	<b>382,025</b>	<b>330,836</b>	<b>305,698</b>	<b>302,400</b>	<b>326,248</b>	<b>370,360</b>	<b>405,015</b>	<b>507,622</b>	<b>344,413</b>	<b>339,801</b>	<b>401,806</b>	<b>5,654,677</b>
<b>NON-OCRWM<sup>7</sup></b>																	
NRC Fees	0	0	0	0	0	19,932	18,674	22,870	19,650	19,962	21,100	22,000	22,000	11,000	15,000	15,000	207,188
NWTRB	0	0	0	0	0	0	0	2,000	0	3,294	2,060	2,160	2,664	2,531	2,600	2,600	19,909
NWN	0	0	0	0	0	0	0	5,959	0	0	0	1,000	1,000	0	0	0	7,959
<b>TOTAL (NON-OCRWM)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19,932</b>	<b>18,674</b>	<b>30,829</b>	<b>19,650</b>	<b>23,256</b>	<b>23,160</b>	<b>25,160</b>	<b>25,664</b>	<b>13,531</b>	<b>17,600</b>	<b>17,600</b>	<b>235,056</b>

Note: Each cost entry is rounded to the nearest thousand. Minor discrepancies may occur in the totals due to rounding.

<sup>1</sup> All OCRWM cost categories are OCRWM baselined projects, except for First Repository, Program Integration, and the subdivisions of the ATI Project. OCRWM costs are from end-of-year Financial Information System reports.

Non-OCRWM costs before FY90 are NRC -reported costs; after FY89, the costs are appropriations.

<sup>2</sup> Includes \$100M, \$120M, \$129.43M, \$200M, and \$190M in funding from Defense Nuclear Waste Appropriation in FY93, FY94, FY95, FY96, FY97, and FY98, respectively.

<sup>3</sup> Engineering development costs include MPC development from FY93 through FY98.

<sup>4</sup> Waste acceptance costs prior to FY93 were included in program management and integration.

<sup>5</sup> MRS project support costs are in program management and integration in FY93, FY94, and FY96 and in ATI project integration in FY95.

<sup>6</sup> Includes debt service from FY83 to FY85 of \$3.316M, \$4.472M, and \$2.512M, respectively. Does not include FY88 and FY89 NRC fees cost of \$38,606,205 recorded in the Financial Information System in FY89.

<sup>7</sup> All costs are appropriations, except for NRC fees in FY88 and FY89. The costs for FY88 and FY89 are actual costs reported by NRC.

ATI = acceptance, transportation, and integration

FY = fiscal year

MPC = multipurpose canister

MRS = monitored retrievable storage

NRC = Nuclear Regulatory Commission

NWN = Nuclear Waste Negotiator

NWTRB = Nuclear Waste Technical Review Board

OCRWM = Office of Civilian Radioactive Waste Management

RTP = Repository Technology Program

These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.

**Table 2-5. 1998 Total System Life Cycle Cost Estimate Summary**  
(in millions of 1998 dollars)

Cost Element	WBS/Cost Account	Historical (1983–1998)	Future Cost Without Contingency	Contingency Cost	Total Cost	Contingency Percentages
<b>Monitored Geologic Repository Costs</b>	<b>1.2</b>	<b>4,910</b>	<b>20,620</b>	<b>3,590</b>	<b>29,120</b>	<b>0–40</b>
<b>Development and Evaluation (1983–2002) Costs</b>		<b>4,910</b>	<b>990</b>	<b>0</b>	<b>5,900</b>	<b>0</b>
Single Repository (MGR) (Yucca Mountain Site)	1.2	3,210	990	0	4,200	0
Other First Repository Characterization	N/A	1,590	0	0	1,590	0
Second Repository	2	110	0	0	110	0
<b>Surface Facilities</b>		<b>0</b>	<b>5,480</b>	<b>1,100</b>	<b>6,580</b>	<b>14–40</b>
Licensing		0	120	30	150	24
Preemplacement Construction		0	900	280	1,180	31
Emplacement Operations		0	3,790	530	4,320	14
Monitoring Operations		0	570	230	800	40
Closure and Decommissioning		0	100	30	130	30
<b>Subsurface Facilities</b>		<b>0</b>	<b>5,310</b>	<b>710</b>	<b>6,020</b>	<b>0–17</b>
Licensing		0	90	0	90	0
Preemplacement Construction		0	860	120	980	14
Emplacement Operations		0	3,230	430	3,660	13
Monitoring Operations		0	950	130	1,080	14
Closure and Decommissioning		0	180	30	210	17
<b>Waste Package Fabrication</b>		<b>0</b>	<b>4,980</b>	<b>970</b>	<b>5,950</b>	<b>0–20</b>
Licensing		0	40	0	40	0
Preemplacement Construction		0	50	0	50	0
Emplacement Operations		0	4,870	970	5,840	20
Monitoring Operations		0	20	0	20	0
Closure and Decommissioning		0	0	0	0	0
<b>Performance Confirmation</b>		<b>0</b>	<b>1,780</b>	<b>540</b>	<b>2,320</b>	<b>0–30</b>
Licensing		0	100	30	130	30
Preemplacement Construction		0	190	50	240	26
Emplacement Operations		0	810	270	1,080	33
Monitoring Operations		0	680	190	870	28
Closure and Decommissioning		0	0	0	0	0
<b>Regulatory, Infrastructure, and Mgmt Services</b>		<b>0</b>	<b>2,080</b>	<b>270</b>	<b>2,350</b>	<b>9–22</b>
Licensing		0	320	30	350	9
Preemplacement Construction		0	460	40	500	9
Emplacement Operations		0	880	110	990	13
Monitoring Operations		0	370	80	450	22
Closure and Decommissioning		0	50	10	60	20
<b>Waste Acceptance, Storage, and Transportation</b>	<b>3</b>	<b>480</b>	<b>5,100</b>	<b>810</b>	<b>6,390</b>	<b>0–20</b>
<b>Development and Evaluation (1983–2005) Costs</b>		<b>480</b>	<b>50</b>	<b>0</b>	<b>530</b>	<b>0–10</b>
Storage (No Interim Storage Fund Facility)		200	0	0	200	0
Transportation		210	30	0	240	0
Waste Acceptance		20	10	0	30	0
Multipurpose Canister Project		40	0	0	40	0
Program Management and Integration		10	10	0	20	0
<b>Mobilization and Acquisition (2005–2010)</b>		<b>0</b>	<b>120</b>	<b>20</b>	<b>140</b>	<b>0–20</b>
National Transportation		0	100	20	120	20
Waste Acceptance		0	10	0	10	0
Program Management and Administration		0	10	0	10	0
<b>Operations (2010–2042)</b>		<b>0</b>	<b>4,930</b>	<b>790</b>	<b>5,720</b>	<b>16–17</b>
National Transportation		0	4,880	780	5,660	16
Waste Acceptance		0	50	10	60	20
<b>Nevada Transportation</b>	<b>1.2</b>	<b>0</b>	<b>520</b>	<b>270</b>	<b>790</b>	<b>13–60</b>
Engineering and Construction		0	440	260	700	60
Operations		0	80	10	90	13
<b>Program Integration</b>	<b>9</b>	<b>1,480</b>	<b>2,290</b>	<b>220</b>	<b>3,990</b>	<b>0–12</b>
<b>Program Management and Administration</b>	<b>9.1</b>	<b>1,210</b>	<b>1,900</b>	<b>220</b>	<b>3,330</b>	<b>12</b>
Quality Assurance	9.2	90	520	60	670	12
Program Management and Integration	9.3	960	1,140	130	2,230	11
Human Resources and Administration		160	240	30	430	13
<b>Non-OCRWM Nuclear Waste Fund Costs</b>		<b>270</b>	<b>390</b>	<b>0</b>	<b>660</b>	<b>0</b>
Nuclear Regulatory Commission Costs	N/A	240	360	0	600	0
Nuclear Waste Technical Review Board	N/A	20	30	0	50	0
Nuclear Waste Negotiator	N/A	10	0	0	10	0
<b>Institutional Costs</b>		<b>210</b>	<b>2,590</b>	<b>600</b>	<b>3,400</b>	<b>0–32</b>
Payments Equal to Taxes	1.2.10	40	1,700	540	2,280	32
Benefits	1.2.10	0	470	0	470	0
180(c) Assistance	3	0	390	60	450	15
Financial Assistance	1.2.10	170	30	0	200	0
<b>TOTAL CRWMS COST</b>		<b>7,080</b>	<b>31,120</b>	<b>5,490</b>	<b>43,690</b>	

CRWMS = Civilian Radioactive Waste Management System      OCRWM = Office of Civilian Radioactive Waste Management  
MGR = Monitored Geologic Repository      WBS = work breakdown structure

These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.

**Table 2-6. Comparison of the Viability Assessment Cost Estimate  
With the Total System Life Cycle Cost Estimate  
(in millions of 1998 dollars)**

Cost Element	VA Cost	TSLCC Increment	TSLCC Total
<b>Historical Costs (1983–1998)</b>	<b>0</b>	<b>7,080</b>	<b>7,080</b>
<b>Repository Future Costs</b>	<b>19,700</b>	<b>4,510</b>	<b>24,210</b>
Development and Evaluation <sup>1</sup>	990	0	990
Surface	5,430	1,150	6,580
Subsurface	5,000	1,020	6,020
Waste Package Fabrication	4,060	1,890	5,950
Performance Confirmation	2,060	260	2,320
Regulatory, Infrastructure, Management Support	2,160	190	2,350
<b>ATI Future Costs</b>	<b>0</b>	<b>5,910</b>	<b>5,910</b>
<b>Nevada Transportation</b>	<b>0</b>	<b>790</b>	<b>790</b>
<b>Program Integration Future Costs<sup>1</sup></b>	<b>30</b>	<b>2,480</b>	<b>2,510</b>
<b>Institutional Future Costs</b>	<b>60</b>	<b>3,130</b>	<b>3,190</b>
Payments Equal to Taxes <sup>1</sup>	30	2,210	2,240
Benefits	0	470	470
180(c) Assistance	0	450	450
Financial Assistance <sup>1</sup>	30	0	30
<b>Total<sup>2</sup></b>	<b>19,790</b>	<b>23,900</b>	<b>43,690</b>

*Note: The 1998 historical cost is an estimate. These cost estimates reflect DOE's best estimates, given the scope of the work identified and planned schedule of required activities. Future budget requests for the program have yet to be established, and, in any event, will be determined through the annual executive and congressional budget process.*

<sup>1</sup> Viability Assessment Volume 4 costs of \$1,080 million in constant 1998 dollars (\$1,138 million year of expenditure) have been divided into these four categories.

<sup>2</sup> The Viability Assessment Volume 5 total cost estimate is \$18,716 million in constant 1998 dollars.

ATI = Acceptance, Transportation, and Integration

TSLCC = total system life cycle cost

VA = Viability Assessment